

NEW COMBINATIONS IN NORTH AMERICAN  
*SYMPHYOTRICHUM* SUBGENUS *ASTROPOLIUM*  
(ASTERACEAE: ASTEREAEE)

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ABSTRACT

Five new combinations in *Symphyotrichum tenuifolium* and *S. subulatum*, of subgenus *Astropolium* (Nutt.) Semple are presented. A selection of synonyms are listed for each taxon. Geographical ranges of each variety is presented and the characteristics and distributions of intermediate populations are discussed.

RESUMEN

*Symphyotrichum* subgenus *Astropolium* (Nutt.) Semple ha sido típicamente circunscrita usando los nombres de *Aster* subg. *Oxytripolium* (DC.) Torr. & A. Gray o *S. sect. Oxytripolium* (DC.) G.L. Nesom (Jones 1980; Semple & Brouillet 1980; Sundberg 1986; Nesom 1994). Todas las interpretaciones recientes han incluido un grupo central de taxa norteamericanos y se han incluido otros taxa principalmente en base a una morfología compartida o número cromosómico base.

INTRODUCTION

North American species of *Symphyotrichum* subgenus *Astropolium* (Nutt.) Semple have typically been treated as *Aster* subg. *Oxytripolium* (DC.) Torr. & A. Gray (Jones 1980; Semple & Brouillet 1980; Sundberg 1986). These references have included a core group of taxa with shared morphological characteristics and base chromosome number. Several additional taxa were included in the subgenus, but were excluded by Sundberg (1986). Nesom (1994) placed the core group of taxa in *Symphyotrichum* sect. *Oxytripolium* (DC.) G.L. Nesom and added seven South American species. Sundberg's (1986) treatment of the subgenus included eight taxa in three species, all of which were recognized at the species rank by Nesom (1994).

This paper presents five new combinations in *Symphyotrichum tenuifolium* and *S. subulatum*, making them available for use in an upcoming volume of the Flora of North America. No new combinations are proposed in the third North American species of subgenus *Astropolium*, *S. potosinum* (A. Gray) G.L. Nesom. A selection of synonyms are listed for each taxon. Data presented here are summarized from Sundberg (1986).

### **Symphyotrichum tenuifolium**

*Symphyotrichum tenuifolium* consists of the two parapatric varieties, *tenuifolium* and *aphyllum*. Both varieties are diploids with  $n = 5$  chromosomes (var. *tenuifolium*: Louisiana, St. Mary Parish, Sundberg 2195; var. *aphyllum*: Florida, Monroe Co., Sundberg 2325). The varieties can be distinguished using the following key:

1. Plants colonial, rhizomes long, not profusely branched; stems solitary, not wiry; midstem leaves (1.5–)3–6 mm wide; involucre 6–9.5(–11) mm; disc florets 25–45(–54), (4–)4.7–6(–6.5) mm; ray florets (12–)17–25; cypselae 2.8–4(–4.5) mm; pappus 5–6.1 mm \_\_\_\_\_ var. **tenuifolium**
1. Plants not colonial, rhizomes short, compact, profusely branched; stems clustered, slender, wiry, narrow; midstem leaves nearly filiform, (1–)1.5–2.7 mm wide; involucre 4.1–5.3 mm; disc florets (10–)13–23, 3.4–4.6 mm; ray florets 10–16 mm; cypselae 1.5–2(–2.5) mm; pappus 3–4.4 mm \_\_\_\_\_ var. **aphyllum**

*Symphyotrichum tenuifolium* var. *tenuifolium* is distributed along the Atlantic coast of the United States from Massachusetts to northern Florida, and along the Gulf of Mexico coast from northern Florida to Texas. It is not uncommon on dark-colored mud in coastal salt marshes.

Variety *aphyllum* has a more southern distribution and is known from dark mud or marl in coastal salt marshes of southern and central Florida, the Bahamas, and Cuba.

Intermediates between the two varieties are frequent along the Gulf of Mexico Coast, from Taylor to Pinellas counties, in northern and central peninsular Florida. In these populations varieties *tenuifolium* and *aphyllum* intergrade in nearly all distinguishing characters (Table 1, Table 2), especially in stem diameter, leaf width, and head size. The rhizome system of intermediates is generally more like that of var. *tenuifolium*. Individuals in the northern part of this zone of intergradation closely approach the morphology of var. *tenuifolium*, southern populations are more similar to var. *aphyllum*, but most populations combine features of both varieties. Observations of populations in the field suggest that the extreme forms are clonally-derived, peripherally divergent populations between the varieties.

Sundberg (1986) conducted hybridization experiments between two individuals of var. *tenuifolium* with var. *aphyllum*. Following sixteen attempts to cross the varieties, he reported a 31% hybridization success rate (based on recovery of mature cypselae). Hybrid plants exhibited a mixture of vegetative traits of the two varieties. When compared to the parent taxa, the hybrids were intermediate in leaf and stem widths and rhizome morphology. Only vegetative characters were assessed, as experiments were terminated before the hybrids flowered.

**Symphyotrichum tenuifolium** (L.) G.L. Nesom, *Phytologia* 77:293. 1994 (1995).

BASIONYM: *Aster tenuifolius* L., Sp. Pl. 2:873–874. 1753. TYPE?: "in America septentrionale," without collector or date, specimen number 997.26 (LINN; photographs GH!, NY!, UC!). This specimen is annotated *A. tenuifolius* in Linnaeus's handwriting.

TABLE 1. Character states used to distinguish *Symphytotrichum tenuifolium* var. *tenuifolium*, var. *aphyllum*, and intermediates in Table 2.

Character	var. <i>tenuifolium</i>	var. <i>aphyllum</i>	intermediates
Habit	rhizomes creeping	stems clustered	na
Midstem leaf width	> 3 mm	< 2 mm	2–3 mm
Involucre height	> 6 mm	< 5 mm	5–6 mm
Number of disk florets	> 25	< 22	22–25
Disk floret length	> 4.6 mm	< 4.3 mm	4.3–4.6 mm
Number of rays	> 17	< 14	14–17
Cypselae length	> 2.8 mm	< 2.4 mm	2.4–2.8 mm
Pappus length	> 4.5 mm	< 4.0 mm	4.0–4.5 mm

TABLE 2. Representative specimens of *Symphytotrichum subulatum* vars. *tenuifolium* and *aphyllum*, arranged from north to south along the Gulf coast of peninsular Florida. \*Morphological characteristics of var. *tenuifolius* (T), var. *aphyllus* (A), or intermediate (-); characters are listed in the order used in Table 1.

Florida County	Voucher	Character states*	Identification
Gulf	Sundberg 2241 (TEX)	T-TTTT-T	var. <i>tenuifolius</i>
Franklin	Sundberg 2253 (TEX)	T-TTTTTT	var. <i>tenuifolius</i>
Taylor	Godfrey 61659 (FSU)	TAAAAAA	intermediate
Taylor	Sundberg 2271 (TEX)	TATT-T—	intermediate
Levy	Sundberg 2291 (TEX)	TAT-T—T	intermediate
Levy	Sundberg 2293 (TEX)	TATTTT-T	intermediate
Levy	Cooley & Eaton 6417 (FSU)	ATA—	intermediate
Citrus	Godfrey 65111 (FSU)	AATT—AA	intermediate
Citrus	Barilotti s.n. (NLU)	TATAT-AA	intermediate
Hernando	Sundberg 2302 (TEX)	TA-AA-AA	intermediate
Hernando	Sundberg 2302 (TEX)	TAT—TA	intermediate
Hernando	Cooley 5460 (NY)	AA-A—A-	intermediate
Hernando	Cooley 5460 (GH)	TAT-TTA-	intermediate
Pinellas	Thorne 9401 (GH)	TA-AT—	intermediate
Hillsborough	Sundberg 2308 (TEX)	AAAAAAA	var. <i>aphyllus</i>
Charlotte	Sundberg 2315 (TEX)	AAAAAAA	var. <i>aphyllus</i>
Lee	Brumbach 8726 (NY)	AAAAAAA	var. <i>aphyllus</i>

***Symphytotrichum tenuifolium* (L.) G.L. Nesom var. *aphyllum* (R.W. Long) S.D. Sundb., comb. nov.** BASIONYM: *Aster tenuifolius* L. var. *aphyllus* R.W. Long, *Rhodora* 72:40. 1970. TYPE: U.S.A. FLORIDA. Hillsborough Co.: NW of Tampa, S of State Route 580 and W of Rocky Creek, 24 Dec 1962, Lakela 25610 (HOLOTYPE: GH; ISOTYPES: GA!, RSA!, USF!).

*Aster bracei* Britton ex Small, Fl. Miami 190, 200, 1913. *Symphytotrichum bracei* (Britton ex Small) G.L. Nesom, *Phytologia* 77:276. 1995. TYPE: BAHAMAS. NEW PROVIDENCE: 31 Aug 1904, Britton & Brace 394 (HOLOTYPE: NY!).

### **Symphyotrichum subulatum**

*Symphyotrichum subulatum* is widely distributed in moist habitats in the Americas, from southern and eastern states of the United States, through the Caribbean islands and Central America, to South America. Variety *ligulatum* is a widespread weedy annual on disturbed soils from Nebraska south to Tamaulipas, Mexico, and from Alabama to New Mexico. Variety *parviflorum* occurs in North America, West Indies, Mexico, and northern South America and has been introduced in other parts of the world. Variety *elongatum* grows in Florida, coastal Georgia, and the Bahamas. Variety *subulatum* is common in salt marshes and brackish areas along the Atlantic coast from New Brunswick to northern Florida. Variety *squamatum* is an introduced taxon in the United States and elsewhere, with a native habitat of saline and freshwater regions, especially in the southern half of South America.

The five varieties recognized here differ in chromosome number, ligule size, capitulescence morphology, number of disk and ray florets, head size, and presence of basal rosettes. Within a single population plants may be tall and with numerous capitula, or short and monocephalous. Within a variety it is typical for individual diagnostic characters to vary.

*Symphyotrichum subulatum* has a base chromosome number of  $x = 5$ . Varieties *ligulatum* (Texas, Travis Co., Sundberg 1375), *parviflorum*, (California, Kern Co., Sundberg 2094) and *subulatum* (Georgia, Glynn Co., Sundberg 2342) are diploids with  $n = 5$ , and varieties *elongatum* (Florida, Dade Co., Sundberg 2324) and *squamatum* (Argentina, Prov. Salta, Lavin & Lavin 5809) are tetraploids with  $n = 10$  (for 79 more chromosome count citations, see Sundberg 1986). Greenhouse studies of the species (Sundberg 1986) showed that varieties *elongatum*, *parviflorum*, *squamatum*, and *subulatum* are self-compatible. This may facilitate the fixation of variant forms and result in greater infraspecific variability in these varieties. Variety *ligulatum* is not self compatible and is the least variable taxon.

The varieties intergrade morphologically where their distributions approach one another. This may be the result of past hybridization events and limited gene flow across reproductive barriers. Artificial hybrids produced in the greenhouse among the varieties are highly sterile, yet, for example, 2% of the pollen of the triploid hybrid, var. *parviflorum*  $\times$  var. *elongatum* stains darkly with cytoplasmic stain, suggesting that a small fraction of the pollen may be viable (Sundberg 1986).

Varieties *ligulatum* and *parviflorum*: Populations intermediate in ligule length and width occur in trans-Pecos Texas, parts of New Mexico (including the type of *A. neomexicanus* Wootton & Standl., collected in Chaves Co.), Arizona, and Chihuahua, Mexico. These are fertile plants in stable populations and produce plump, apparently viable cypselae.

Varieties *elongatum* and *subulatum*: Intermediates between these varieties occur sporadically in northeastern Florida (Duval County) and along the coast

of the Florida panhandle. Intergradation is demonstrated in the compactness of the capitulescence and the number of disk and ray florets.

Varieties *elongatum* and *parviflorum*: Although readily distinguishable over much of their ranges, similar forms of the two varieties are found in southern Florida, where their distributions approach. In this area individuals of var. *parviflorum* are more robust (to 1.5 m tall) than elsewhere and the ligules are often pink, instead of white. Variety *parviflorum* is usually more diffusely and more equally branched in the capitulescence than var. *elongatum*. The latter variety often has long branches in the capitulescence, with shorter peduncles that are often disposed toward the upper side of the branch. In addition, variety *parviflorum* has shorter heads, narrower phyllaries, fewer and shorter ray florets, and fewer disk florets than var. *elongatum*.

**Symphiotrichum subulatum** (Michx.) G.L. Nesom, *Phytologia* 77:293. 1994 (1995).

*Aster subulatus* Michx., *Fl. Bor.-Amer.* 2:111. 1803. TYPE: U.S.A. "Pensylvania:" *Michaux's n.* (LECTOTYPE [Bosserdet 1970]; P. photograph TEX!).

**Symphiotrichum subulatum** (Michx.) G.L. Nesom var. **elongatum** (Boss.) S.D. Sundb., *comb. nov.* BASIONYM: *Aster subulatus* var. *elongatus* Boss., *Taxon* 19:250. 1970. TYPE: U.S.A. FLORIDA. Hillsborough Co.: Tampa, 20 Aug 1895, *Nash 2416* (LECTOTYPE [Jones & Lowry 1986]; P. photograph: TEX!).

*Aster bahamensis* Britton, *Bull. Torrey Bot. Club* 41:14. 1914. *Aster subulatus* Michx. var. *bahamensis* (Britton) Boss., *Taxon* 19:249. 1970. *Symphiotrichum bahamense* (Britton) G.L. Nesom, *Phytologia* 77:276. 1994 (1995). TYPE: BAHAMAS. Great Bahama: Barnett's Point, 5-13 Feb 1905, *Britton & Millspaugh 2621* (HOLOTYPE: NY!; photograph TEX!; ISOTYPE: P!).

**Symphiotrichum subulatum** (Michx.) G.L. Nesom var. **ligulatum** (Shinners) S.D. Sundb., *comb. nov.* BASIONYM: *Aster subulatus* Michx. var. *ligulatus* Shinners, *Field & Lab.* 21:159. 1953. TYPE: U.S.A. TEXAS. Hill Co.: 6.9 mi SW of Hillsboro, bottom of dried-up pond, sandy clay, rays light lavender, 23 Oct 1949, *Shinners 12057* (HOLOTYPE: SMU; ISOTYPE: GH!).

*Tripolium divaricatum* Nutt., *Trans. Amer. Philos. Soc.* n.s. 7:296. 1841. *Aster divaricatus* (Nutt.) Torr. & A. Gray, *Fl. N. Amer.* 2:163. 1841. non L., *Sp. Pl.*: 873. 1753, *Symphiotrichum divaricatum* (Nutt.) G.L. Nesom, *Phytologia* 77:279. 1994 (1995). Type: Inundated [sic] banks of the Mississippi, *Nuttall s.n.* (HOLOTYPE: PH!; photograph TEX!).

Distinctive, localized forms of variety *ligulatum* occur in some areas. Collections from the Dallas-Fort Worth area of Texas have particularly small heads and florets. Along the coast of Texas and Tamaulipas, near the mouth of the Rio Grande and southward, plants are especially large, sometimes over two meters tall, and exhibit the largest capitula, with the most phyllaries, ray florets, and disk florets found in the variety. These forms intergrade gradually into more typical forms and are not deemed to be worthy of nomenclatural recognition.

**Symphiotrichum subulatum** (Michx.) G.L. Nesom var. **parviflorum** (Nees) S.D. Sundb., *comb. nov.* BASIONYM: *Tripolium subulatum* (Michx.) DC. var.  $\beta$  *parviflorum* Nees, *Gen. sp. Aster*: 157, 286. 1833. TYPE: U.S.A. HAWAII: Oahu, 1816 or 1817, *Chamisso s.n.* (LECTOTYPE, here designated: G-DC; microfiche! photograph!).

*Erigeron expansus* Poepp. ex Spreng., Syst. Veg. 3:518. 1826. *Symphotrichum expansum* (Poepp. ex Spreng.) G.L. Nesom, Phytologia 77:281. 1994 (1995). TYPE: "En. pl. Cub. MSS. In siccis calidis Cubae. Octbr." (HOLOTYPE: W?; ISOTYPES: HALI, MOI, NY, FI).

*Aster divaricatus* (Nutt.) Torr. & A. Gray var. *sandwicensis* A. Gray in H. Mann, Proc. Amer. Acad. Arts 7:173. 1867. *Aster sandwicensis* (A. Gray in H. Mann) Hieron., Bot. Jahrb. Syst. 29:20. 1901. *Aster subulatus* Michx. var. *sandwicensis* (A. Gray ex H. Mann) A.G. Jones, Brittonia 36:465. 1984. TYPE: U.S.A. HAWAII: Oahu, 1816 or 1817, *Chamisso s.n.* (LECTOTYPE: [Jones 1984]: G-DC; microfiche!, photograph!).

Jones (1984) designated a specimen in G-DC as the lectotype of *Aster divaricatus* var. *sandwicensis* and listed homotypic and heterotypic synonyms of the variety. She listed *Tripolium subulatum* (Michx.) DC. var.  $\beta$  Nees as "unnamed" in the list of homotypic taxa, but did not recognize, or explicitly lectotypify, the variety. Sundberg later examined high resolution photographs of the lectotype and identified the specimen as var. *parviflorum*, and not var. *squamatum*, as the name has been applied in earlier publications.

Nees (1833) cited *Tripolium subulatum* (Michx.) DC. var.  $\beta$  as " $\beta$ . Parviflorus, caule supradecomposito, calathiis dimidio minoribus," which could be interpreted as a polynomial, or an informal description of a form. However, on page 286, in "synonyma addenda vel corrigenda" Nees writes, "Ad *Tripolium subulatum* var.  $\beta$  parviflorum p. 157, *Aster inconspicuus* Less. in Schlechtend. Lin. V. p. 143," which changed the "*parviflorus*" to "*parviflorum*" to agree in gender with *Tripolium*. He indicated that " $\beta$  parviflorum" was based on *A. inconspicuus* Less., and associated "Var." with the varietal epithet. Thus, Nees' correction was to list *A. inconspicuus* Less. as a synonym of his new variety. The lectotype of var. *parviflorum* is further selected on the basis of Nees' (1833) statements on p. 143 that "Var.  $\beta$  in O Wahu insula (Cham.)," and "Vidi exempla Americae borealis et O Wahu insulae," indicating that he had seen a specimen of the variety collected in Oahu by Chamisso.

Variety *parviflorum* varies in ligule length, ligule pigmentation (white or pink), head size, and vegetative characters. Populations with abnormally large heads and pigmented ligules occur sporadically in the states of Mexico and Veracruz, of central Mexico.

***Symphotrichum subulatum*** (Michx.) G.L. Nesom var. ***squamatum*** (Spreng.) S.D. Sundb., comb. nov. BASIONYM: *Conyza squamata* Spreng., Syst. Veg. 3:515. 1826, *Aster squamatus* (Spreng.) Hieron., Bot. Jahrb. Syst. 29:19. 1901. *Conyzanthus squamatus* (Spreng.) Tamamschjan, FL., U.R.S.S. 25:186. 1959. *Symphotrichum squamatum* (Sprengel) G.L. Nesom, Phytologia 77:292. 1994 (1995). TYPE: URUGUAY: Montevideo, *Sello[w] s.n.* (HOLOTYPE: P).

Sprengel's Asteraceae specimens were sold to Schultz-Bipontinus, whose herbarium is now part of the Cosson herbarium at P (Stafleu & Cowan 1985). Because this is the only known collection by Friedrich Sellow from Montevideo in the Sprengel Herbarium, the P specimen (Sprengel Herb #1064) may be regarded as a holotype. Stafleu and Cowan note that Sello crossed out the letter

"w" on many labels to reflect the original family name. Sprengel used the spelling, "Sello" in the original description.

The branching of the capitulescence, head size, and cypsela pubescence vary greatly in var. *squamatum*. Populations with glabrous cypselae, and narrow phyllaries and heads occur in the vicinity of Tucuman Province in Argentina, as well as around Buenos Aires. In other respects these plants are typical of the variety. In Chile a form with large involucre (8.5 mm high), ligules that extend 1.5 mm beyond the pappus, and cypselae ca. 3.2 mm long exist. These occur in proximity to populations of typical var. *squamatum*, which has shorter involucre, cypselae, and ligules. Similar large-headed forms, but with short ligules are found in Peru. Collections of these variants of var. *squamatum* are few and additional study may reveal that some of the populations represent distinct varieties.

**Symphytotrichum subulatum** (Michx.) G.L. Nesom var. **subulatum**

*Aster subulatus* Michx. var. *obtusifolius* Fernald, Rhodora 16:61. 1914. TYPE: CANADA. NEW BRUNSWICK. Gloucester Co.: Bathurst, brackish marsh along Middle River, 13 Aug 1913, Blake 5372 (HOLOTYPE: GH; ISOTYPES: CASI, LLI, NYI, USI).

*Aster subulatus* Michx. var. *euroaster* Fernald & Griscom, Rhodora 37:183. 1935. TYPE: U.S.A. VIRGINIA. Norfolk Co.: border of gum swamp near North Landing, 22 Sep 1933, Fernald & Griscom 2919 (HOLOTYPE: GHI).

*Aster ensifer* Boss., Taxon 19:250. 1970. TYPE: U.S.A. MASSACHUSETTS: Cambridge, margin of salt marsh, 2 Oct 1901, Robinson & Fernald 65 (HOLOTYPE: P, photograph TEX; ISOTYPES: CASI, DSI, GAI, GHI, ILL, LLI, MICH, MOI, NYI, POMI, UCI, USI).

Plants of variety *subulatum* from the northern Atlantic coast are shorter, with fewer capitula, larger leaves in the capitulescence, and longer ligules than plants from the southern Atlantic coast of the United States. The form that occurs in New Brunswick has been treated as *Aster subulatus* Michx. var. *obtusifolius* Fernald. However, this represents an extreme form in a gradual cline, and one variable variety is recognized here.

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